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Audiovisual programs designed to bring current developments in medicine to general practitioners individually are also meant to shape their subsequent behavior. There are many problems in preparing these programs, most of them involved with the fact that the medical consultant and the educational production group must work interdependently. The medical consultant must transmit hard-won and complex knowledge rapidly to the programing staff who will then transmute it into programs. The relationship between the two is crucial to the project, and this report details a recommended order of the tactics which specify the relationship. This includes initial contact by the administration with the medical consultant, the initial work by him, initial writing conference with him, writing by a programmer of the content outline and script, preparation by the medical consultant of the content essay, final script preparation by a programmer or producer, and production of visuals by the producer. Then the skeleton program, consisting of slides, in-house tape, program book, and test, is validated, approved, put into physical production, and packaged. Programs are then mailed to sample. Attachments A, B, C, and D are comprised of forms, a medical essay, and a program script. (GO)

Research Memorandum Number 3
May, 1967

STRATEGY AND TACTICS FOR PROGRAM PREPARATION

by

James D. Finn, Stephen Abrahamson,
and Diana Caput



MEDICAL INFORMATION PROJECT

A joint project of the School of Medicine and
the School of Education, University of South-
ern California.

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School of Medicine

School of Education

University of Southern California

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Introduction

The preparation of these audiovisual programs designed for viewing by general practitioners is an exacting and difficult task. It involves, among other things, the transformation of complex medical and basic science knowledge into a new form which is tight, vigorous, and brief - and which makes use of a new medium. Above all, in this form the information is intended to direct the physician to action, or, as the operant conditioning psychologists say, change, modify, or shape his behavior. It is not formed merely to exist qua information.

The creation of such material has to be a team job with the members of the team learning from one another. The medical consultant is the key man on the team, but the educational and communications personnel also have important contributions to make. The medical consultant will find himself in the difficult

position of having to teach a piece of his hard-won specialty to a group of very naive students - the educational production group - in a short period of time. This is indeed a challenge, but it must be remembered that the best chance of reaching the general practitioner with new knowledge on which he can act is through the programing group.

General Strategy

The general strategy of the programing portion of the project, then, may be defined as the production of twenty-four audiovisual medical programs designed to change the behavior of the general practitioner in the directions specified in the statement of work of the project. (This is described in the project information leaflet.) The accomplishment of this general objective requires the formation of smoothly functioning teams which can convert important raw medical information into an audiovisual program format, hopefully leading the general practitioner to action.

Programing Strategy

This document is not the place for a lengthy discussion of the programing strategy selected for the Medical Information Project nor for an elaborate defense of this strategy as opposed to all possible strategies. However, it would be well to describe briefly the main points of the programing approach as

helpful in understanding the tactics selected. The main point of this paper is the specification of the relationship of the programing team to the medical consultant. This relationship, however, occurs in the context of programing decisions already made.

The main decisions are:

1. The program will be presented in audiovisual form using a machine that can sit on a desk or table in a doctor's office.
2. The medium will be projected still colored pictures, reenforced by sound.
3. The programs will be approximately twenty-four minutes in length, broken up into units of five to six minutes each. A program, then, will have (usually) four self-contained parts. A subject may be covered in one, two, or more programs.
4. The program will present content in sequences of frames which will be followed by a frame which directs the physician to a program book, after which the machine will automatically stop. The book will require some sort of response - labeling a diagram, filling in a blank, selecting an alternative in a multiple choice question, etc. The doctor will then restart the machine for the next sequence.

At the completion of the program, a summary frame will be presented. Following this, on a form provided for this purpose, the physician will take a short content test, which is self-scoring, and he will also evaluate the program.

5. For purposes of analysis, these programs may be said to have the following type frames:

a. Motivational frames (MF). These frames will attempt to motivate the doctor with reference to the content and objectives.

A special form of motivational frame can be said to be the:

b. Objective frame (OF). This is a frame which relates to the major objective of all the programs; namely, to get the doctor to change his communication behavior in the direction of seeking more information, preferably on a systematic basis.

c. Content frames (CF). These are the frames containing information.

d. Summary frames (SF). As the name indicates, these frames summarize the main point of a presentation sequence and may be related to "b" above. They can also be considered

the end of the old military training sequence:

Tell them what you are going to tell them;

tell them; tell them what you have told them.

e. .Response frames (RF). These frames refer the doctor to the program book where he will be asked to respond to a question or problem.

A few years ago, programed instruction, according to the statements of most of its proponents (principally psychologists), had to be developed according to one of several defined and opposing theories. The two most often set up as opposites were the small step-behavior shaping-successive approximation-constructed response-no mistake approach of B. F. Skinner and the larger step-branching if a mistake is made-multiple choice response associated in those days with Norman Crowder. Sometimes Skinner and Pressey were set in opposition, with (and this is highly oversimplified) multiple choice versus constructed response, mistakes allowed versus always correct, etc.

Further, after a few months of flirting with machine instruction, much, but not all, of the movement opted for programed texts in book or notebook form. For the most part this eliminated the consideration of any other type of media, such as motion pictures, in program format. Furthermore, many of the programmers and the psychologists doing research

on programmed instruction were highly oriented to language as opposed to any other form of communication.

Recently, however, the entire programmed instruction movement seems to have broadened its base, become more eclectic, and no longer acts as if discipleship to a particular point of view is a prerequisite to engaging in some sort of programming activity. Study of a recent authoritative publication¹ reveals that, rather than viewing programming as related to a particular psychological theory, it is now thought of more as an engineering process involving (1) a clear statement of objectives, preferably in behavioral form, (2) the design of a program built to achieve these objectives, using any combinations of theories and media, (3) the validation of this program on individual subjects and, later, the field testing of it on populations of students with subsequent revision, etc., and (4) release of the program for instructional purposes complete with performance data derived from the testing.²

And while there are, no doubt, many people still writing Skinnerian frames for printing on paper, there is an increasing

¹Phil C. Lange, ed, Programmed Instruction, Sixty-sixth Yearbook of the National Society for the Study of Education, Part II (Chicago: University of Chicago Press, 1967).

²Some proponents of this point of view, such as Ofiesh and Markle, claim this formula is the instructional technology. Finn views this position as slightly presumptuous.

interest and some small research and development activities in programing in different forms of media.³ This is a trend that can now be observed but is, by no means, all-pervasive. Some programmed instruction people speak derisively of the entire audiovisual movement.

The general strategy for preparing the programs for the Medical Information Project is in this new eclectic tradition, but not derived from it. Essentially it is derived from years of experience in preparing audiovisual presentations, some small experimentation with classical programmed instruction, and a conviction that S. L. Pressey's point of view about the construction of learning materials has a great deal of validity, particularly for audiovisual materials.

In 1963, following a discussion of his general theory, Pressey referred directly to program construction in the following words:

...initial presentation of what is to be learned will be in field trip, demonstration or experiment, or most commonly a substantial unit like an inclusive textbook chapter, not all mixed up with autoinstruction. The "autodiscussion" would follow and its function

³ See, for example, Susan M. Markle and Philip W. Tiemann, "Guide to the Programed Videotape," Programing is a Process (Chicago: Office of Instructional Resources, University of Illinois at Chicago, 1967, offset); and W. H. Allen and Robert T. Filep, Visual and Audio Stimuli in Machine Programmed Instruction, Cooperative Research Project No. 1956 (Washington: U. S. Office of Education, in press).

would be...to enhance the clarity and stability of cognitive structure by correcting misconceptions, and deferring the instruction of new matter until there had been such clarification and elucidation.

In difficult matter such as a science text or industrial or military training manual, bits of autoinstruction may be needed more frequently; each step in the solution of a difficult problem may need such autoelucidation...if the autoinstruction is thus to follow presentation of what is to be learned, then...it will deal only with issues which need further clarification or emphasis. Such adjunct autoelucidation will not cover everything, may jump from one point to another or even back and forth. (Italics in the first sentence of the second paragraph inserted by the writer).⁴

The Project Director became convinced about 1962 that the Pressey approach, modified somewhat by what has been learned about audiovisual presentations, would be the most useful in applying program engineering to individualized audiovisual teaching. The modifications have to do with motivation, with creativity and "showmanship," and with the body of knowledge relating to format derived from the early work of Carpenter and his associates and from advertising and readership studies (labeling, shape, size, composition, etc.). Generally speaking, those psychologists and programmed instruction experts that are today beginning to experiment with

⁴Sidney L. Pressey, "Teaching Machine (and Learning Theory) Crisis," Journal of Applied Psychology, Vol. 47, No. 1 (February, 1963), p. 3.

other media and program formats are experiencing great difficulty.⁵ Some of their audiovisual work, too, reveals, to put it charitably, a lack of sophistication not commensurate with their programing concepts.

Finally, and most important to the balance of this document, are the difficulties of relating a programmer or programing team to the subject matter expert, in our case, the professor of medicine. The literature on programed instruction is very vague on this point, and many existing public school programs have been criticized for inaccurate or oversimplified content.

The question of the role of content or knowledge in any given piece of instruction and its relation to the behaviors sought from the student varies from field to field, level to level, and time to time as well as with the nature, level, and real needs of the student. Thus, the fundamental question we must keep in mind is: what is the role of knowledge or information in the real-time practice of medicine?

It appears, from what we have learned so far in working

⁵In a personal conversation with James D. Finn, P. Kenneth Komoski, one of the pioneers in programed instruction, dwelt at length on the difficulties and frustrations of producing programed television shows.

⁶The classical story in this regard is the unhappy reaction of Professor Jerrold Zacharias, the famous physicist, to a program in physics developed by B. F. Skinner and his students.

with the medical staff, that this is a very difficult question. It is not possible or desirable to present a doctor with a "cook book" approach to medicine; on the other hand, the search for causation in the esoteric regions of biochemistry may not relate very directly to Mrs. Smith's skin problem and, hence, not be of much real use to the practitioner.

Some behavior-oriented programers appear to think more or less exclusively in cook-book terms; others go to the opposite extreme and, under a loose guise of eliciting behavior, really play verbal games in which one kind of stimulus, e. g., cigarette, may elicit the proper verbal response (behavior?), e. g., hazardous to health, without having any effect in the process. Obviously, in dealing with the medical content of this project, we must avoid both of these extremes.

We are also dealing, relatively speaking, with a highly educated population whose day by day experiences are, presumably, also educative. This is said, even though it is well known that the majority of the general practitioners in the United States do not, for one reason or another, "keep up" as they should with medical information.

Sheer knowledge in medicine is important. It is important for the doctor, however, only in terms of very sophisticated applications. For it appears that, using

knowledge as a base, the doctor must make many decisions in diagnosis and treatment - decisions based on abilities to discriminate, to detect the operation of multiple organic forces, etc. Sheer knowledge left alone will be sterile under these conditions; a simple formula, on the other hand, can very often deny the organic situation with which it is intended to deal.

What all this means to the medical consultant and the programing staff is that the medical information must be made, in Hoban's words, instrumental rather than substantive⁷ - but instrumental at a high level of sophistication.

For these reasons, it is believed that the relationship between the programing staff and the medical consultant is absolutely crucial to this project. An attempt has been made in the next section, therefore, to analyze and specify this relationship in some detail in order to develop the best possible content for the programs. These tactics must be viewed, however, as tentative and subject to revision as experience progresses.

⁷C. F. Hoban, Fourth Quarterly Report: An Interim Statement on the Audience for Professional Journals (Philadelphia: Institute for Cooperative Research, University of Pennsylvania, July, 1966, mimeo).

Programing Tactics

The specific operations to be followed in developing the programs are stated in sequence below. Where several are to occur at the same time, it will be indicated.

1. The Advisory Committee

The Medical Information Project proposal and the contract provide for an Advisory Committee whose main function is to select the areas of medicine and the topics, to suggest the medical consultants, and to review the final product. The committee is composed of:

Dr. Phil R. Manning, Chairman
Associate Dean, Postgraduate Education
U. S. C. School of Medicine

Dr. Ralph Bennett
Past President, California Academy
of General Practice

Dr. J. Samuel Denson
Professor of Surgery, Chairman of
Anesthesiology
U. S. C. School of Medicine

Dr. Donald W. Petit
Associate Professor of Medicine
U. S. C. School of Medicine

Dr. Leonard H. Schwartz
Assistant Medical Director and
Director, Out-Patient Department
Los Angeles County General Hospital

Dr. Norman Shrifter
Associate Clinical Professor of Medicine
U. S. C. School of Medicine

2. Program Topics and Proposed Consultants

The Advisory Committee's selections of areas and topics were:

<u>Topic</u>	<u>Consultant</u>
1. Resuscitation (1-2) a. Closed heart resuscitation b. Defibrillation	Dr. J. Samuel Denson Professor of Surgery (Anesthesiology, Chairman)
2. Office Gynecology (2-3) a. Pap smears	Dr. Gail V. Anderson Assoc. Prof., OB & Gynecology and Dr. Lester T. Hibbard Assoc. Prof., OB & Gynecology Dr. George A. Macer Asst. Clinical Prof., OB & Gyn. and Dr. Charles F. Langmade Asst. Clinical Prof., OB & Gyn.
3. OB Emergencies (2) a. Birth Control	Dr. Gordon P. Griggs Asst. Clinical Prof., OB & Gyn.
4. Management of Cardiac Problems a. Heart failure b. Arrhythmia (2-3) c. Coronary (1)	Dr. David H. Blankenhorn Assoc. Professor of Medicine and Dr. Francis Y. K. Lau Assoc. Prof., Medicine & Radiology (Cardiology) and Dr. Julian L. Haywood Asst. Professor of Medicine
5. Treatment of Respiratory Infections (1-2)	Dr. John M. Leedom Asst. Professor of Medicine
6. Office Emergencies (1-2) a. Anaphylactic reactions b. Local anesthetics	Dr. J. Samuel Denson
7. Anemia (1-2)	Dr. Samuel I. Rapaport Professor of Medicine
8. Hypertension (1-2)	Dr. Robert F. Maronde Assoc. Professor of Medicine and Pharmacology

- | | |
|--|---|
| 9. Office Dermatology (2-3) | Dr. Norman E. Levan
Professor of Medicine
(Dermatology) |
| 10. Cortico-steroids | Dr. David A. Berman
Professor of Pharmacology
and
Dr. Robert F. Maronde |
| 11. Tranquilizers (1) | Dr. David A. Berman
and
Dr. Robert F. Maronde |
| 12. Office Evaluation of
Pulmonary Function (1-2) | Dr. Oscar J. Balchum
Assoc. Professor of Medicine |
| 13. Management of Chronic
Pulmonary Disease (1) | Dr. Oscar J. Balchum |
| 14. Examination of Newborn
(1-2) | Dr. Joan Hodgman
Assoc. Professor of Pediatrics
and
Dr. Robert L. Spears
Assistant Professor of
Pediatrics |
| 15. Office Orthopedics (2) | Dr. Paul J. Harvey, Jr.
Assoc. Professor of Surgery
(Orthopedics, Chairman)
and
Dr. Lorin L. Stephens
Asst. Clinical Prof. of Surgery
(Orthopedics) |
| 16. Office ENT (2) | Dr. Alden H. Miller
Clinical Professor of Surgery
(O,R,L, Chairman)
and
Dr. Clay W. Whitaker
Assistant Professor of Surgery
(O,R,L) |
| 17. Headache (1) | Dr. Howard S. Barrows
Assoc. Professor of Neurology
and
Dr. Ruth A. McCormick
Assistant Professor of Neurology |

18. Rectal Diseases (1)

Dr. E. E. Wadsworth, Jr.
Asst. Clinical Prof., Surgery
(Proctology)

19. Common Diseases of the
Eye (1)

Dr. Clinton A. Wilson
Assoc. Clinical Prof., Surgery
(Ophthalmology)

Note: More topics were selected than can be programed in order to make substitutions in case of problems. The order is the preferred order listed by the Committee. Number of programs suggested follows each topic in parenthesis. Topics and consultants are organized around units of the U.S.C. School of Medicine. These consultants may want to add other faculty members to the consulting team or to appoint one or more as the responsible consultant. Thus, the final program may involve two or three consultants, including a different head consultant than the one listed.

3. Initial Contact with the Medical Consultant

- a. Dean Manning will contact the consultant initially to get his cooperation in the program.
- b. Dr. Abrahamson will then contact the consultant and discuss, in general, the requirements, pay, etc. The confirming letter will cover the topics to be discussed.
- c. A confirming letter will be sent to the consultant covering:
 - (1) the program
 - (2) the topic
 - (3) expectations of the consultant
 - (4) the pay
 - (5) estimate of time involved
 - (6) materials that may be required

Enclosed, in order to supplement the information in the letter, will be:

- (1) information leaflet on the MIP
- (2) copy of Strategy and Tactics of Program Preparation
- (3) copy of Mager: Preparing Instructional Objectives
- (4) forms for outline and objective writing

4. Initial Work by the Medical Consultant

The medical consultant should:

- a. begin to think about his topic in terms of the needs of the general practitioner as he knows them and the relation of these needs to his specialty.
- b. tentatively select an area of content which he feels will be amenable to treatment in the time allotted and by audiovisual means.
- c. go through the Mager program book on objectives.
- d. attempt to write three or four objectives in terms of the content selected in "b." See Attachment A for form.
- e. prepare a gross content outline covering the material, indicating on the outline where he sees a relationship to the objectives he has written. The form appearing as Attachment B will be used for this purpose.
- f. pull together materials which he feels will be of use to the writer and producer in understanding the content and suggesting possible visuals. These would include books, pertinent articles, pamphlets, drug company materials, etc., plus any materials he has developed on this topic such as slides, transparencies, etc. If he can suggest motion pictures that the communications staff should see or any other outside material they should obtain, this would be very helpful. It would also be helpful if the written materials were marked to relate to the content outline and the objectives.

5. Initial Writing Conference With the Medical Consultant

- a. The assigned writer, after being advised by Dr. Abrahamson that the material has been supplied the consultant, will call the consultant and set up a conference.

- b. If possible, in addition to the writer, the producer, Wilson Brydon, and Dr. Abrahamson and Dr. Finn will attend. However, the conference must be scheduled as promptly as possible, and, if difficulties of getting people together intervene, the writer should go ahead and set up the conference.
- c. In the conference, the following should be covered, although not necessarily in this or any prescribed order:
 - (1) explore the topic as to its importance to the general practitioner and as to its parameters.
 - (2) arrive at an understanding of what audiovisual programing can and cannot do, including time constraints.
 - (3) attempt a clarification of objectives and, if possible, final agreement on objectives.
 - (4) elicit, either directly or indirectly, the consultant's suggestions as to possible motivations for this topic.
 - (5) engage in a discussion of the content, using the gross outline as a basis and keeping the general practitioner in mind. The consultant should view this as the beginning of teaching the material to the programing group.
 - (6) discuss possible time distribution of the six-minute segments of the program and make a tentative decision.
 - (7) go over materials consultant has provided as to importance, relation to content outline, etc., and elicit any recommendations for other materials such as films, etc., as noted above.

6. Writing Detailed Content Outline and Begining Script and Production

- a. Writer will study materials provided by the consultant;
- b. rewrite objectives in more specific behavioral form, if necessary;

- c. begin to fill in gross outline in great detail;
- d. talk with consultant as needed during this time and continue to explore motivation ideas with the consultant;
- e. obtain outside materials, such as films, if any, and review them;
- f. bring work and materials to first script conference devoted to the program. Present should be Brydon, Abrahamson, Finn, and other writers, if any.
- g. Materials should be examined, key items passed on to the producer, films reviewed, etc. Content outline should be studied; suggested treatment developed.
- h. Writer will finish detailed outline working with consultant, carefully noting relationship with the initial objectives and time distribution in the program. Key points will also be noted for programing frames.
- i. Writer will deliver detailed outline to medical consultant for criticism, change, final form. Consultant will immediately begin the essay described in 7. below.
- j. A second script conference will be held, preferably involving the consultant; motivational and program frames will be decided upon.
- k. Initial creation of motivational frames will begin.

7. Medical Consultant Prepares Content Essay

- a. This can be done directly by writing from the content outline. Attachment C shows such an essay written by Dr. Sanford Kronenberg for the first quarter of Program # 1. Possible illustrations and relation with the objectives should be noted.

OR

- b. The medical consultant will be supplied with a tape recorder which will permit him to talk his essay on tape; the tape will be transcribed and returned to him for any editing he cares to do.
- c. Three or four key references which the general practitioners should be urged to look at should be listed.
- d. The one key paper for the "giveaway" will be selected and reproduced.

8. Final Script Preparation

- a. Upon receipt of the content essay, the final writing will be assigned, either to the initial writer, to the producer, or to another writer.
- b. An audio script will be produced with suggested visuals.
- c. The producer will rework the script and lay out the story board.
- d. Programing and summary frames will be produced.
- e. Simultaneously, visual production will begin.
- f. Completed script and story board furnished medical consultant for approval and/or changes. Attachment D is an approved script for the first one-quarter of Program # 1.

9. Production

- a. The detailed scheduling of production is presented in Research Memorandum Number 4, Program Production Schedule.
- b. As soon as possible according to this schedule, the producer will supply the visuals in the form of slides. These will be photographs of actual objects and actual events and photographs of pencil sketches of the art work.

- c. An in-house tape will be prepared from the audio script and beeped.
- d. The tape and slides will be mounted in the test machine for validation.
- e. Final program book and test will be duplicated for tryout.

10. Validation

- a. The skeleton program on slides and in-house tape, the program book, and the test will be validated, using standard procedures, on one to three general practitioners.
- b. Changes will be made and revalidation carried out as necessary.
- c. Final version will be shown to medical consultant for approval.

11. Production To Approval

- a. Final art work will be photographed and entire program in the final form will be on slides.
- b. Using the in-house tape and program on slides, the program will be shown to the Advisory Committee and formal approval requested.

12. Production Completed

- a. After approval, the producer will turn over final recorded tape and slides to physical production and packaging.
- b. Program workbook sheets, test, and evaluation form will at the same time be printed and furnished mailer.

13. Mailing

Two weeks after receipt for processing, programs will be mailed to sample.

MEDICAL INFORMATION PROJECT

Program on _____

Medical Consultant _____

Statement of Objectives

First Draft

Note: Think in terms of a twenty-four minute program divided (usually) into four segments. The number of achievable objectives is not likely to be large.

OBJECTIVE NUMBER ONE

OBJECTIVE NUMBER TWO

OBJECTIVE NUMBER THREE

MEDICAL INFORMATION PROJECT

Suggested Form for Content Outline

- For Use by Medical Consultants -

TOPIC	APPLICABLE OBJECTIVE	NOTES ON POSSIBLE MATERIALS including visuals
1. ----- ----- a. ----- ----- b. ----- -----	Given condition X, the doctor, within _____ time, should be able to _____ _____	Best Book: Smith, Jones & Robinson, <u>Homeostasis</u> Good article: Stephen Abrahamson, <u>JMA</u> , April, 1966 You should look at the SK&F film on this subject. I also have a pretty good transparency.

ATTACHMENT B

PART I, PROGRAM I

Original Essay by Dr. Sanford Kronenberg

Resuscitation implies treatment intended to either (1) aid respiratory or cardiovascular mechanisms which are failing and whose efficiency are so impaired as to lead to death, or (2) restore respiratory or cardiovascular mechanisms which have ceased to operate.

It can be directed toward the respiratory system, toward the cardiovascular system, or, as is most frequently the case, toward both simultaneously.

The treatment of patients who suffer sudden and unexpected death requires efficient and knowledgeable management which at first may seem rather complex but which ultimately can be resolved into a fairly simple set of essential maneuvers.

Progressive respiratory insufficiency with cessation of respiration leads to cardiac arrest. In its progressive form movements of the chest and diaphragm become weaker and weaker. Cyanosis begins to appear. The blood pressure, pulse and heart sounds soon disappear. A convulsive seizure may occur. The pupils dilate and clinical death has occurred. Resuscitation may still be effective in restoring life.

Conversely, if cardiac arrest occurs first, respiration stops within seconds. There may be a few feeble contractions of some muscles of respiration and an agonal gasp or two. A convulsive seizure may occur. Cyanosis appears as moderate lividity of the skin and nail beds. The pupils dilate quickly and there is no further evidence of life. Resuscitation may, however, still be effective in restoring it.

In former years, our attempts to revive persons centered on respiratory resuscitation. It is now apparent that respiratory resuscitation must be reserved for those individuals whose heart is still beating. Examples of such pathological states are barbiturate overdose, carbon monoxide poisoning, a flail chest from severe trauma, rupture of an intracranial blood vessel, fracture of the neck with paralysis of muscles of respiration, myasthenia gravis, paralytic poliomyelitis, a foreign body in the airway, edema of the tissues of the throat, and any condition in which respiratory exchange is inadequate to sustain life, and in which the heart is still beating but will quit from lack of oxygen if respiratory resuscitation is not promptly initiated.

Today, therefore, we clearly distinguish between patients whose heart beat appears to be absent and those whose respiration is failing. As quickly as one can determine that there are no cardiac contractions, (i.e., no blood

pressure, pulse or heart beat) in any person in the office or on the street, cardiac resuscitation must be started to establish some degree of artificial circulation.

Furthermore, respiratory resuscitation must accompany it, hand in hand, so that blood artificially circulated will find oxygen in the alveoli of the lungs to pick up and distribute to the dying tissues of the body.

The elimination of carbon dioxide from the blood and lungs is, of course, an essential concomitant feature of the process.

Resuscitation thus takes on two forms: (a) artificial ventilation of the lungs for respiratory arrest and (b) massage of the heart in conjunction with pulmonary ventilation for cardiac arrest.

Our subject at this time is artificial respiration.

The two most important signs of respiratory arrest are cyanosis and lack of visible or audible respiration. Each of these must be qualified in order to appreciate their significance from patient to patient.

Cyanosis is an indicator of the amount of reduced hemoglobin in the skin or mucosa. Its intensity will vary according to the total amount of hemoglobin in a unit volume of blood, the amount of blood in the tissue, the rate of perfusion of the tissue, other pigments in the skin and the source of illumination in the room.

When a patient's hemoglobin is less than 5 grams per 100 cubic centimeters of blood, there is an insufficient quantity to produce the distinctive color of cyanosis, even though all of it is in the reduced form.

Intense vasoconstriction limits the amount of blood to such an extent that there is little if any color added to the skin by the blood. The mucous membranes and nail beds are pale and ashen, and cyanosis is barely visible.

Cyanosis, then, reveals the presence of reduced hemoglobin but can be used as a sign of respiratory arrest only in relation to certain factors that alter its color and intensity.

Respiratory insufficiency results in certain patterns of abnormal respiration, which can be corrected to avoid death by respiratory failure. The normal volume of tidal exchange is approximately 500 cubic centimeters, 150 of which are anatomically useless since they occupy the upper airway never reaching the alveolar sacs. There may be so little movement of the chest and diaphragm that an inadequate amount of air enters the lung to keep the patient alive. Furthermore, the minute volume of respiratory exchange may be limited if the rate of breathing is less than the normal of 12 to 20 per minute.

Thus far no reference has been made to the airway as a factor in respiratory exchange. When the airway is entirely

patent there is no impence to gas flow. Obstruction anywhere along the airway prevents free ingress and egress of air, to the extent that if the obstruction is complete, exaggerated inspiratory efforts by the patient will serve no purpose.

Obstruction of this nature can be recognized by the characteristic picture it presents. Instead of the chest rising with each inspiration it will appear to contract. As the diaphragm moves downward and the abdomen rises, the entire chest paradoxically appears to move in the wrong direction. The lungs cannot expand because air cannot enter them.

Partial obstruction of the airway presents a picture midway between the two extremes. Again, the picture is quite characteristic. The patient may be in coma. There is stertorous breathing audible throughout the room.

The patient appears to be in distress. The chest does not rise freely on inspiration and there is some degree of paradoxical movement. The suprasternal notch and intercostal spaces retract with each breath. The alae nasae dilate. The strap muscles of the neck contract in an attempt to elevate the thoracic cage and there is a tracheal tug.

These signs prevail when a patient is still able to reflexly initiate his own respirations. Should respiratory reflexes be severely depressed, as in the attempted suicide from hypnotic drugs or the narcotic addict who has critically

exceeded his limit of tolerance, the picture is one of a deeply comatose patient and the classical signs of obstruction are minimized.

Obstruction, whether complete, moderate or minimal, creates different patterns of abnormal respiration and signals the fact that respiratory arrest will occur if it is not relieved in the process of initiating artificial ventilation.

RESUSCITATION SCRIPT - PART I

If there is a sword of Damocles hanging over the physician, it is the nightmare of a patient dying in the doctor's office. To this nightmare, of course, could be added the possibility of relatives filing a lawsuit. There is, obviously, no sure preventive for such an unfortunate occurrence, but there is a good insurance policy. Although it isn't sold by Prudential, Metropolitan, or any other company, such an insurance policy is available to the doctor who wants it. This policy is a well grounded knowledge of respiratory and cardiac resuscitation...knowledge, by the way, that will stand up in any court of the land, if it should come to that.

In cases of respiratory or cardiac arrest, the key to saving a patient's life - or his mind - lies in prompt action by the physician. But this action must be based on a correct diagnosis of the condition - which in turn relates to a thorough understanding of the pathological events which are occurring.

We then have a three step process - knowledge, diagnosis, action - and all three steps must be right. In this program we will be primarily concerned with the action the doctor must take in conditions of respiratory and cardiac arrest, but since this is not a first aid training program for Boy Scouts or firemen, we need to review the highlights of the latest knowledge of these conditions with you. After all, it is your professional judgement as well as your skill in action that will save a patient's life.

It is well, however, for both of us to keep our eye on the program ball. The important actions that we will illustrate in this program are (1) mouth to mouth resuscitation, (2) using the s-airway and (3) using the bag and mask. In dealing with conditions of cardiac arrest in the next program, we will cover (1) chest massage, (2) application of drugs and (3) post-resuscitative care.

Now, for a moment or two, let us review the highlights of the complexities of resuscitation. Resuscitation can be applied to the respiratory system, to the cardiovascular system, or, as is most frequently the case, to both simultaneously. If a person collapses or is found in an unconscious or semi-conscious state, it is first necessary to determine whether he is suffering from respiratory insufficiency leading to cardiac arrest or whether, in fact, his heart has already stopped. In making this elementary distinction - which you must make quickly - you are really only assessing the patient's condition in a moving process which you must reverse.

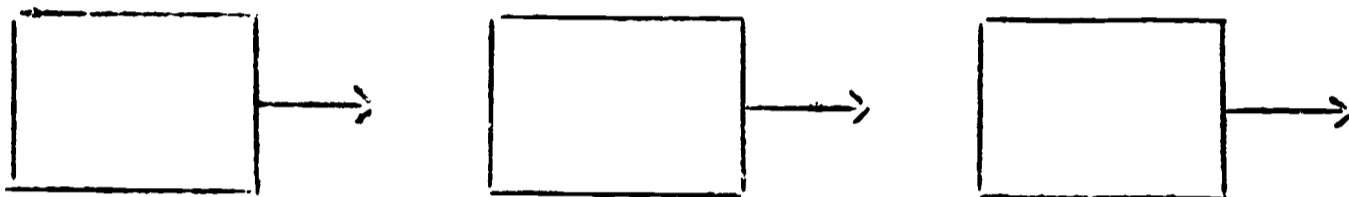
The beginning of this process can be progressive respiratory insufficiency. If unchecked, it leads to the cessation of breathing and to cardiac arrest. In detecting the progressive form of respiratory arrest, you will note that the movements of the chest and diaphragm become weaker and weaker. Cyanosis begins to appear. If the process is allowed to continue, the blood pressure, pulse and heart sounds soon disappear. A convulsive seizure may take place. The pupils dilate and clinical death has occurred.

Conversely, if cardiac arrest occurs first, respiration stops within seconds. There may be a few feeble contractions of some muscles of respiration and an agonal gasp or two.

Cyanosis appears as pale blue coloring of the skin and nail beds. The pupils dilate quickly and there is no further evidence of life. Yet, in many instances, life can be restored by prompt application of the proper resuscitation techniques.

Now, for review purposes, we will stop the record and ask you to respond to the first problem in your program sheet. When you have finished marking it, push the start button and the program will continue.

(Note: next frame is answer frame as okayed by Dr. Kronenberg)



Not too long ago, we attempted to revive people by concentrating on the restoration of normal breathing. We now know that respiratory resuscitation must be reserved for those individuals whose heart is still beating. Examples of such pathological states are barbiturate overdose, carbon monoxide poisoning, a flail chest from severe trauma, rupture of an intracranial blood vessel and fracture of the neck with paralysis of the muscles of respiration. There are also others, such as myasthenia gravis, paralytic poliomyelitis, a foreign body in the airway, and edema of the tissues of the throat. In fact, respiratory resuscitation must be applied to any condition in which the breathing process is inadequate to sustain life, and in which the heart is still beating but will quit from lack of oxygen if the condition is not remedied quickly.

Today, therefore, we clearly distinguish between patients whose heart beats appear to be absent and those whose respirations are failing. In the case of cardiac arrest as quickly as you can determine that there are no cardiac contractions, pulse or heart beat, or a widely dilated pupil, you must start cardiac resuscitation to establish some degree of artificial circulation. But it must always be remembered that you must also apply respiratory resuscitation at the same time. This is so that blood which is being artificially circulated will find oxygen in the lungs to distribute to the dying tissues of the body. Of course, the essential elimination of carbon dioxide from the blood and lungs will also be accomplished.

Again, we are stopping the record so that you can direct your attention to the second problem in your program book. When you have answered, push the start button.

Answer Frame

Two Forms of Resuscitation

- (a) artificial ventilation of the lungs for respiratory arrest
- (b) massage of the heart in conjunction with pulmonary ventilation for cardiac arrest

Although the interrelatedness of respiratory and cardiac arrests is such that one can hardly be considered without the other, we will, for the purposes of analysis turn our attention during the remainder of this program to respiratory arrest and respiratory resuscitation. The second program - which you will receive in about two weeks - will concern itself with cardiac arrest and cardiac resuscitation. In order to continue program one, wait until the record stops, remove film strip number 1 and insert film strip number 2. Then turn the record over and push

it in the slot.

When considering the problem of respiratory arrest and what to do about it, you need to recognize the key signs before acting.

We will discuss two general signs of respiratory failure - cyanosis and lack of visible or audible respiration. This will be followed by a discussion of the signs of an obstructed airway. None of these signs are as simple as they might appear in a first aid manual. Hence, we must talk about qualification - because they are very significant from patient to patient.

Cyanosis is an indicator of the amount of reduced hemoglobin in the skin or mucosa. Its intensity will vary according to the total amount of blood in the tissue, the amount of hemoglobin in a unit volume of blood, the rate of perfusion of the tissue, other pigments in the skin and the source of illumination in the room. On the other hand, there will be no cyanosis if a patient's hemoglobin is less than 5 grams per 100 cubic centimeters of blood. Furthermore, intense vasoconstriction limits the amount of blood flowing to such an extent that there is little if any color added to the skin by the blood. The mucous membranes and nail beds are pale and ashen, and cyanosis is barely visible.

Cyanosis, then, reveals the presence of reduced hemoglobin. However, when you use it as a means of detecting respiratory arrest, your judgement must take into consideration the factors that alter its color and intensity.

Respiratory insufficiency also results in certain patterns of abnormal respiration which can be corrected to avoid death by respiratory failure. The normal volume of tidal exchange is approximately 500 cubic centimeters, 150 of which are anatomically useless since they occupy the upper airway. There may be so

little movement of the chest and diaphragm that an inadequate amount of air enters the lungs to keep the patient alive. Furthermore, the minute volume of respiratory exchange may be limited if the rate of breathing is less than the normal of 12 to 20 per minute.

At this point let's review some of these qualifications you have to check when studying the signs. As the record stops, please refer to your program book. Then press the start button when ready to continue.

Answer Frame

The signs of cyanosis can vary according to:

- (a) hemoglobin/unit volume of blood
- (b) amount of blood in tissue
- (c) rate of perfusion of tissue
- (d) other pigments in the skin
- (e) source of illumination in the room

Let us now consider obstruction of the airway which you can readily recognize by certain signs. Complete obstruction characteristically shows in the chest. Instead of the chest rising with each inspiration it will appear to contract. As the diaphragm moves downward and the abdomen rises, the entire chest paradoxically appears to move in the wrong direction. The lungs cannot expand because air cannot enter them.

Partial obstruction of the airway results in signs midway between the two extremes. Again the picture is quite characteristic. The patient may be in coma. There is noisy breathing and the patient appears to be in distress. The chest does not rise freely on inspiration and there is some degree of paradoxical

movement. The suprasternal notch and the intercostal spaces retract with each breath. The nostrils dilate. The strap muscles of the neck contract in an attempt to elevate the thoracic cage and there is tracheal tug.

These signs prevail when a patient is still able to reflexly initiate his own respirations. Should respiratory reflexes be severely depressed, as in the attempted suicides from hypnotic drugs, or the narcotic addict who has critically exceeded his limit of tolerance, the picture is one of a deeply comatose patient and classical signs of obstruction are minimized.

Airway obstruction, whether complete, moderate, or minimal, creates different patterns of abnormal respiration, patterns which, to you, are signals that respiratory arrest will occur if the obstruction is not relieved and artificial ventilation begun.

Up to this point we have been reviewing with you some of the physiology related to resuscitation problems and some of the signs you use in making a judgement as to how to proceed with resuscitation itself. Instead of a program problem, let's cover the basic concept again.

SUMMARY FRAME

When signs of respiratory insufficiency are present and the heart is still beating, respiratory resuscitation is indicated.

In cardiac arrest, chest massage and respiratory resuscitation are both required at the same time.

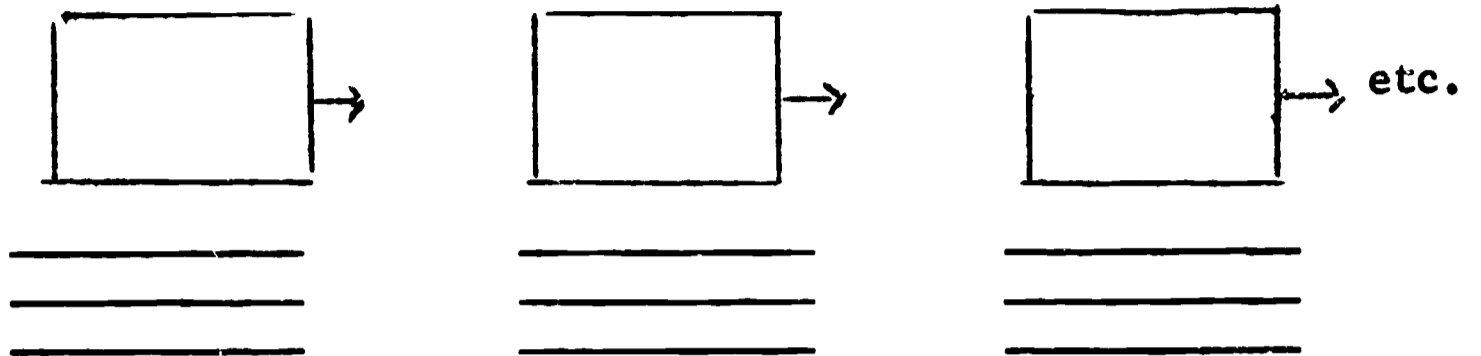
A good doctor recognizes the signs of both very quickly, knows what to do and ACTS IMMEDIATELY.

The other half of this program deals with the techniques of respiratory resuscitation. After the record has stopped, remove film strip number 2 and insert film strip number 3. Then remove the first record and insert the second so that it will play on side number 3.

RESUSCITATION PROGRAM

1. Program Frame 1

(a) In the blocks provided, label possible course of progressive respiratory insufficiency to its end.



(b) Now, in the lines provided underneath, list the 2 or 3 main symptoms of each condition.

2. Program Frame 2

There are, then, two forms of resuscitation. They are:

- (a) _____
- (b) _____

3. Program Frame 3

Under what conditions will the signs of cyanosis vary?
According to:

- (a) _____
- (b) _____
- (c) _____
- (d) _____
- (e) _____